

# Stoichiometry of Electrolytic Cells

$$\begin{aligned} \textcircled{1} \quad Q &= I t \\ &= (1.5)(30) \\ Q &= 45 \text{ C} \end{aligned}$$

$$\textcircled{2} \quad t = \frac{Q}{I} = \frac{375}{1.6} = 234.375 \text{ s}$$

$$234.375 \text{ s} \times \frac{1 \text{ min}}{60 \text{ s}} = 3.91 \text{ min}$$

$$\textcircled{3} \quad n_e = \frac{I t}{F} = \frac{(1.74)(600)}{(96500)} \quad t = 10 \text{ min} \times \frac{60 \text{ s}}{\text{min}} = 600 \text{ s}$$

$$n_e = 0.0108 \text{ mol}$$

$$\textcircled{4} \quad t = \frac{F \cdot n_e}{I} = \frac{(96500)(0.1)}{(3.5)} = 2757.143 \text{ s}$$

$$2757.143 \text{ s} \times \frac{1 \text{ min}}{60 \text{ s}} = 45.95 \text{ min}$$

$$\textcircled{5} \quad t = 35 \text{ min} \times \frac{60 \text{ s}}{1 \text{ min}} = 2100 \text{ s}$$

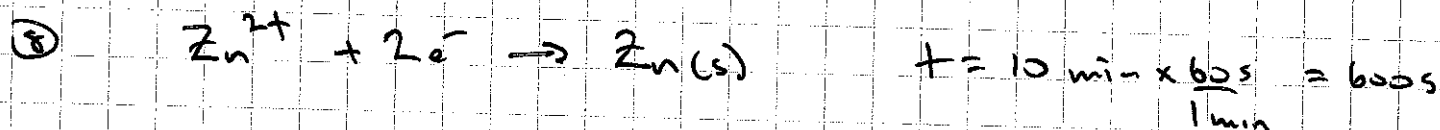
$$n_e = \frac{I t}{F} = \frac{(1.9)(2100)}{(96500)} = 0.0413 \text{ mol}$$

$$\textcircled{6} \quad t = \frac{n_e \cdot \bar{F}}{I} = \frac{(0.146)(96500)}{(1.24)} = 11362.097 \text{ s}$$

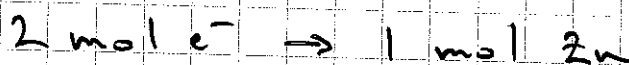
$$11362.097 \text{ s} \times \frac{1 \text{ h}}{3600 \text{ s}} = 3.156 \text{ h}$$

$$\textcircled{7} \quad t = 20 \text{ min} \times \frac{60 \text{ s}}{1 \text{ min}} = 1200 \text{ s}$$

$$I = \frac{n_e \cdot \bar{F}}{t} = \frac{(0.015)(96500)}{(1200)} = 1.206 \text{ A}$$



$$n_e = \frac{It}{\bar{F}} = \frac{(0.5)(600)}{(96500)} = 0.00311 \text{ mol}$$



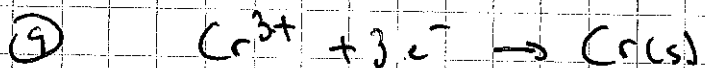
$$n_{\text{Zn}} = n_e \times \frac{1 \text{ mol Zn}}{2 \text{ mol } e^-}$$

$$= 0.00311 \times \frac{1}{2}$$

$$n_{\text{Zn}} = 0.00155 \text{ mol}$$

$$m_{\text{Zn}} = 0.00155 \text{ mol} \times 65.4 \text{ g/mol}$$

$$= 0.102 \text{ g of Zn(s)}$$



$$t = 45 \text{ min} \times \frac{60 \text{ s}}{1 \text{ min}} = 2700 \text{ s}$$

$$n_e = \frac{It}{F} = \frac{(54)(2700)}{(96500)} = 1.511 \text{ mol}$$



$$n_{\text{Cr}} = n_e \times \frac{1 \text{ mol Cr}}{3 \text{ mol } e^{-}}$$

$$= 1.511 \times \frac{1}{3}$$

$$n_{\text{Cr}} = 0.504 \text{ mol}$$

$$m_{\text{Cr}} = 0.504 \text{ mol} \times 52 \text{ g/mol} = 26.2 \text{ g Cr}$$